IN THE CLAIMS

Please cancel claims 4, 8, 14, and 19 without prejudice. Please amend claims 1, 3, 9, 12, and 23 as set forth below.

---

1. (Currently Amended) A method of modeling circulation in a living subject, such method comprising the steps of:

simulating the fluid dynamics of an arterial circulatory system, wherein the simulation models blood flow through a plurality of arterial segments;

adapting the simulation to substantially conform to a specific arterial anatomy of the living subject;

forcing the simulation with a forcing function made up of one or more flow-time or pressure-time signatures;

calculating a blood flow ~~of the circulatory system of the living subject~~ in a first selected arterial segment based upon the forced simulation;

measuring a blood flow in the living subject corresponding to the calculated blood flow; ~~and,~~

correcting the simulation ~~by adjusting a flow resistance of the simulation based upon the ratio of the measured and calculated flows~~ to accomodate for the measured and calculated blood flows;

modifying the simulation to model a particular surgical reconstruction; and,

calculating a post-operative blood flow in a second selected arterial segment using the modified simulation in order to predict an outcome of the actual surgical reconstruction performed in the living subject.

2. (Previously Presented) The method of modeling as in claim 1 wherein the simulated circulatory system includes the Circle of Willis.

3. (Currently Amended) The method of modeling as in claim 1 ~~further comprising the step of calculating a flow of the circulatory system based upon a selected blood flow perturbation~~ further comprising:

calculating a blood in a plurality of selected arterial segments based upon the forced simulation;

measuring blood flows in the living subject corresponding to the plurality of calculated blood flows; and,

correcting the simulation based upon the measured and calculated blood flows.

4. (Cancelled)

5. (Previously Presented) The method of modeling as in claim 1 wherein the step of adapting the simulation to substantially conform to the living subject's anatomy further comprises conforming a vessel of the simulation with a corresponding vessel in an image of the living subject.

6. (Previously Presented) The method of modeling as in claim 5 wherein the step of adapting the simulation to substantially conform to the living subject's anatomy further comprises measuring a diameter of the corresponding vessel in the image of the living subject.

7. (Previously Presented) The method of modeling as in claim 6 further comprising localizing the corresponding vessel in three-dimensional space and tracing a boundary into adjacent areas in three-dimensional space to locate respective ends of the corresponding vessel.

8. (Cancelled)

9. (Currently Amended) The method of modeling as in claim ~~8~~ 1 wherein the simulation of the circulatory system includes a one-dimensional, explicit, finite difference algorithm based

upon a conservation of mass equation, a Navier-Stokes momentum equation, and an equation of state relating local pressure to local artery size.

10. (Previously Presented) The method of modeling as in claim 1 wherein the simulation is forced with a flow measurement obtained from the living subject.

11. (Previously Presented) The method of modeling as in claim 1 wherein the simulation is forced with a pressure-time signature obtained from a prototypical measurement.

12. (Currently Amended) Apparatus for modeling circulation within a living subject, such apparatus comprising:

a computerized simulation of a model of an arterial circulatory system including a plurality of aterial segments, wherein the simulation includes means for calculating blood flows in the circulatory system when the model is forced with a forcing function;

means for adapting the model of the circulatory system to substantially conform to a specific arterial anatomy of the living subject;

means for ~~measuring a blood flow in the circulatory system of the living subject~~ calculating a blood flow in a selected arterial segment;

means for measuring a blood flow in the living subject corresponding to ~~a~~ the flow in the selected arterial segment calculated by the model; ~~and,~~

means for correcting the model based upon the calculated and measured flows; ~~by adjusting a flow resistance based on a ratio of the measured and calculated blood flows~~

means for modifying the simulation to model a particular surgical reconstruction; and,

means for calculating a post-operative blood flow in a second selected arterial segment using the modified simulation in order to predict an outcome of the actual surgical reconstruction performed in the living subject

13. (Previously Presented) The apparatus for modeling as in claim 12 wherein the circulation model further comprises the Circle of Willis.

14. (Cancelled)

15. (Previously Presented) The apparatus for modeling as in claim 12 wherein the means for measuring blood flow is a phase contrast magnetic resonance angiography flow measurement system.

16. (Previously Presented) The apparatus for modeling as in claim 15 wherein the means for adapting the model to substantially conform to the living subject's anatomy further comprises means for selecting a vessel of the model and a corresponding vessel in an image of the living subject.

17. (Previously Presented) The apparatus for modeling as in claim 16 wherein the means for adapting the model to substantially conform to the living subject's anatomy further comprises means for measuring a diameter of the corresponding vessel.

18. (Previously Presented) The apparatus for modeling as in claim 17 further comprising means for localizing the corresponding vessel in three-dimensional space and tracing a boundary into adjacent areas in three-dimensional space to locate respective ends of the corresponding vessel.

19. (Cancelled)

20. (Previously Presented) The apparatus for modeling as in claim 12 wherein the computerized simulation model includes a one-dimensional, explicit, finite difference algorithm based upon a conservation of mass equation, a Navier-Stokes momentum equation, and an equation of state relating local pressure to local artery size.

21. (Previously Presented) The apparatus for modeling as in claim 12 wherein the model is forced with a flow measurement obtained from the living subject.

22. (Previously Presented) The apparatus for modeling as in claim 12 wherein the model is forced with a pressure-time signature obtained from a prototypical measurement.

23. (Currently Amended) A system for modeling circulation in a living subject, comprising:

a computerized fluid dynamics simulation of a model of an arterial circulatory system which includes a plurality of arterial segments;

~~an~~ a first adaptation module for adapting the simulation to substantially conform to a specific arterial anatomy of the living subject;

a blood flow measurement device for obtaining a flow measurement from the living subject; and

a correction module for correcting the model based on ~~a ratio of~~ the measured flow and a corresponding flow calculated by the simulation in a selected arterial segment;

a second adaptation module for modifying the simulation to model a particular surgical reconstruction; and,

wherein the modified simulation calculates a post-operative blood flow in a second selected arterial segment in order to predict an outcome of the actual surgical reconstruction performed in the living subject.

24. (Previously Presented) The system for modeling as in claim 23 wherein the model includes the Circle of Willis.

25. (Previously Presented) The system for modeling as in claim 23 further comprising;

an imaging device for generating an image of the circulatory system of the living subject;

a display device for displaying the generated image of the circulatory system, the display device including a cursor adapted to select a vessel of the image, and,

wherein the selected vessel is input to the adaptation module in order to adapt the model to substantially conform to a specific arterial anatomy of the living subject.

26. (Previously Presented) The system for modeling as in claim 25 further comprising a pixel processing module for processing pixel data from the imaging device of the general area of the selected vessel to locate a boundary between the selected vessel and surrounding tissue.

27. (Previously Presented) The system for modeling as in claim 26 wherein the pixel processing module measures a diameter of the corresponding vessel.

28. (Previously Presented) The system for modeling as in claim 27 wherein the pixel processing module traces the boundary of the selected vessel into adjacent areas in three-dimensional space to locate respective ends of the corresponding vessel.

29-51. (Canceled)

52. (Previously Presented) The method of claim 1 further comprising the step of obtaining a flow measurement in the living subject by phase contrast magnetic resonance angiography.

53. (Previously Presented) The method of claim 1 further comprising the step of obtaining a flow measurement in the living subject by a Doppler flow measurement.

54. (Previously Presented) The apparatus for modeling as in claim 12 wherein the means for measuring blood flow is a Doppler flow measurement device.

55. (Previously Presented) The system of claim 23 wherein the flow measurement device is a phase contrast magnetic resonance angiography system.